MySmartE - An Eco-feedback and Gaming Platform for Energy-Aware Residential Communities

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Project Overview

Vision Develop new S&C technology (MySmartE) to engage community residents in understanding and reducing their home energy use while increasing their environmental awareness and improving their quality of life.

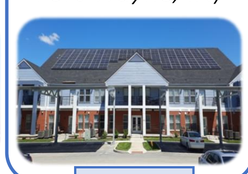
Objectives Derive a systematic solution for 1) learning the decision-making process, 2) evaluating the behavioral changes and developing performance metrics of MySmartE.

MySmartE Overview

Testbed Communities & Data collection

Community 1 (50 households, Indianapolis, IN)

Community 2 (44 households, Fort Wayne, IN)



Community 3 (11 households, South Bend, IN)

Community 4 (25 households, New Albany, IN)

... *Community N*

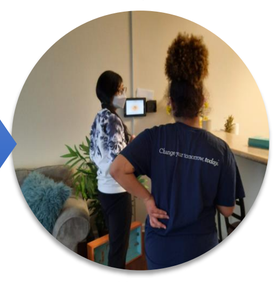
... ***Scale up***

- ❑ 44-unit multi-family affordable housing community
- ❑ Smart devices (i.e., wall-mounted tablet, Amazon Alexa) are installed in each household.

Baseline (Dec. 2019 - Dec. 2020) **Intervention** (Jan. 2021 -)

Smart thermostat & Power meter

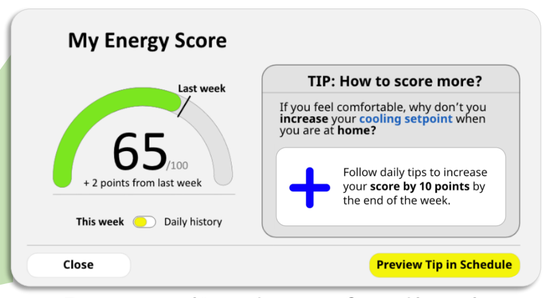
MySmartE app development



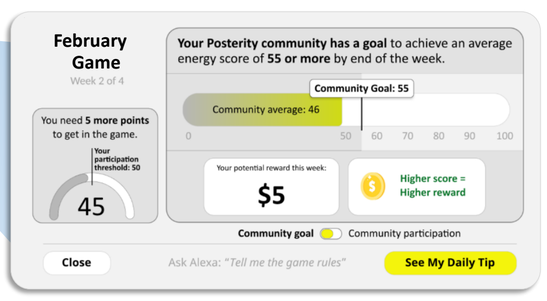
Installation& Resident onboarding

Eco-feedback & Social games

MySmartE App

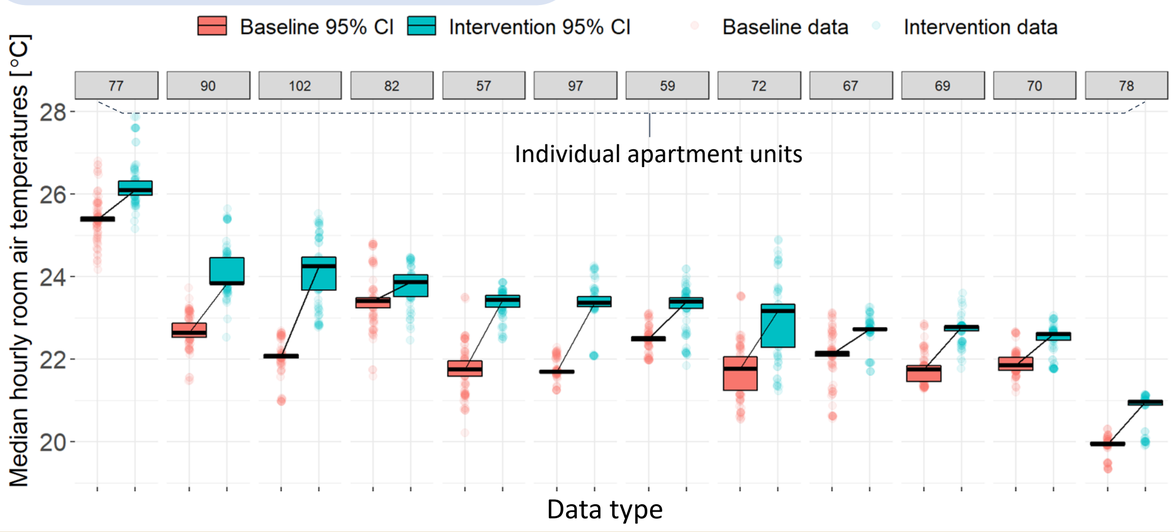


Personalized eco-feedback



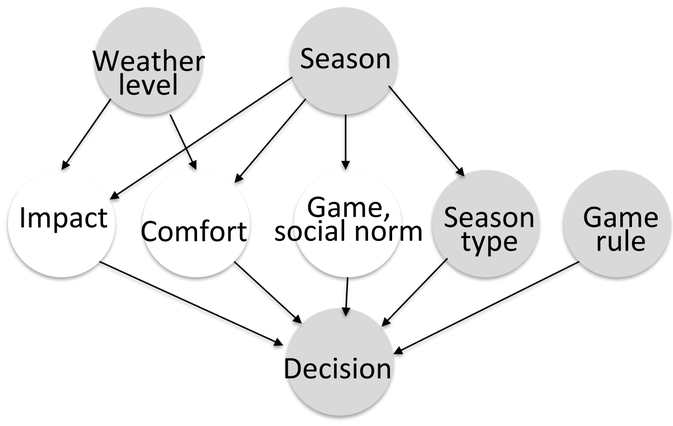
Collaborative community game

Field data



Sociotechnical decision model

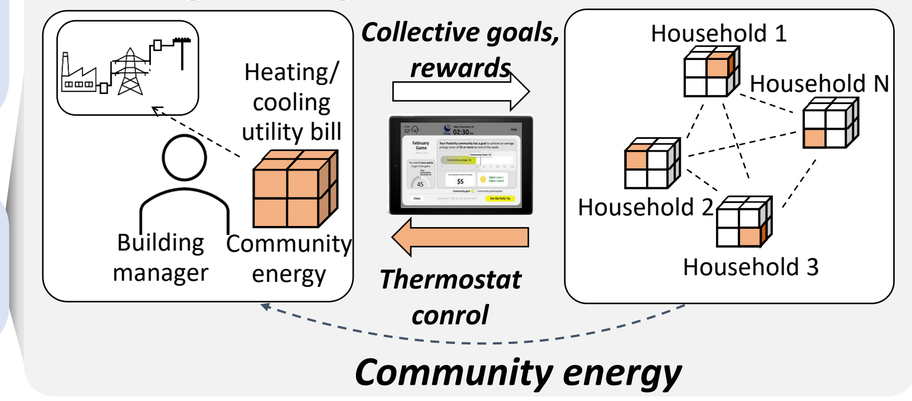
Causal structure

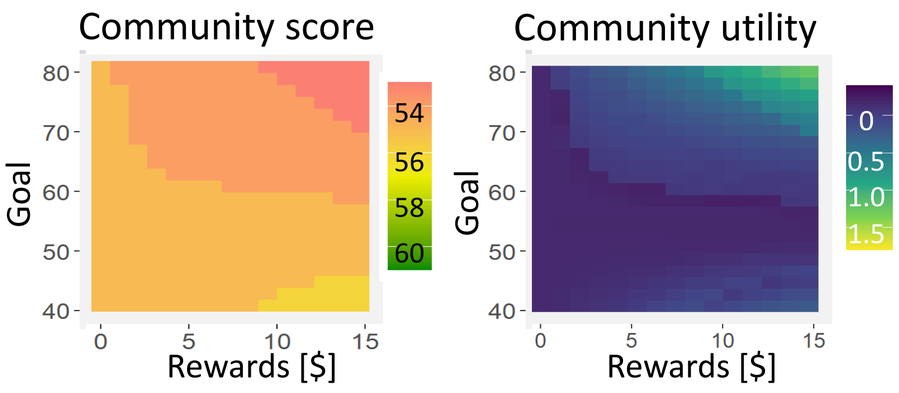


Decision modeling

Causal structure → *Resident utility model* → *Utility maximization* → *Bayesian calibration*

Parameter learning → ***Decision scenario*** → ***Game-theoretic community decision simulation***

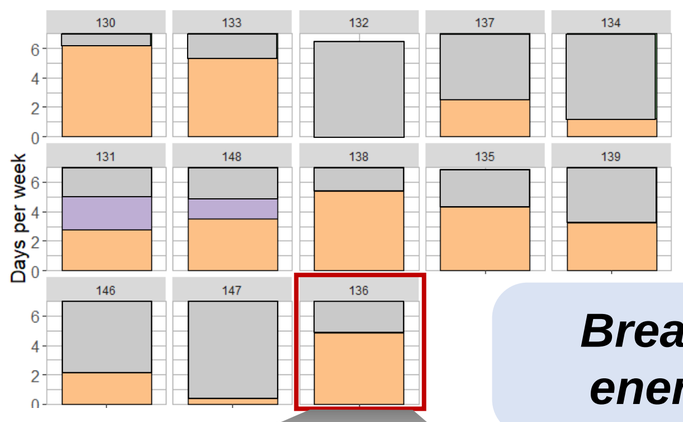




Thermostat adjustment behavior evaluation

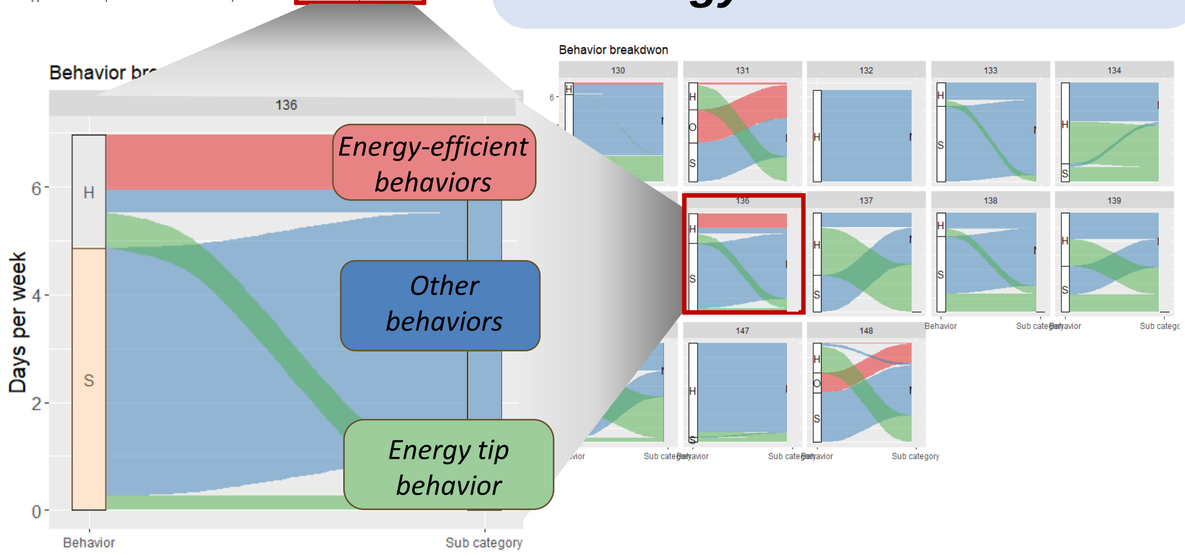
Typical thermostat adjustment behaviors observed during intervention

Thermostat schedule *Setpoint update via hold* *On/off*



13 households in New Albany (week of 8/21/2023)

Breakdown and identify energy-aware behavior



Acknowledgements

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